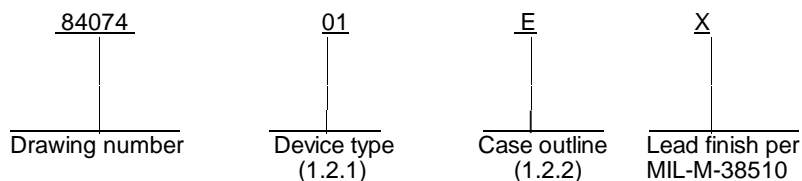


REVISIONS																			
LTR	DESCRIPTION										DATE (YR-MO-DA)					APPROVED			
A	Add vendors, FSCM 18714, 27014, and 04713. Table I, Propagation delay times at $V_{CC} = 2.0\text{ V}$ and $V_{CC} = 6.0\text{ V}$ and subgroups 10 and 11 shall be gauranteed if not tested.										1985 NOV 25					Michael A. Frye			
B	Delete vendor CAGE 31019. Add vendor CAGE 27014 and the S and 2 case outlines. Inactivate case R and 2 for new design. Editorial changes to table I. Change drawing CAGE code to 67268. Editorial changes throughout.										1989 MAY 22					Michael A. Frye			
<b>CURRENT CAGE CODE 67268</b>																			
REV																			
SHEET																			
REV																			
SHEET																			
REV STATUS OF SHEETS				REV		B	B	B	B	B	B	B	B	B	B	B	B		
				SHEET		1	2	3	4	5	6	7	8	9	10	11	12		
PMIC N/A				PREPARED BY Marcia B. Kelleher						DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444									
<b>STANDARD MILITARY DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A				CHECKED BY Ray Monnin															
				APPROVED BY Michael Frye															
				DRAWING APPROVAL DATE 22 OCTOBER 1984															
								REVISION LEVEL  B						SIZE <b>A</b>	CAGE CODE <b>14933</b>	<b>84074</b>			
										SHEET 1 OF 12									

## 1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device type. The device type shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	54HC240	Inverting octal buffer 3-state

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
R	D-8 (20-lead, 1.060" x .310" x .200"), dual-in-line package
S	F-9 (20-lead, .540" x .300" x .100"), flat package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

### 1.3 Absolute maximum ratings.

Supply voltage range ( $V_{CC}$ )	-0.5 V dc to +7.0 V dc
DC Input voltage range	-0.5 V dc to $V_{CC}$ +0.5 V dc
DC output voltage range	-0.5 V dc to +0.5 V dc
Clamp diode current	± 20 mA
DC output current (per pin)	± 35 mA
DC $V_{CC}$ or GND current (per pin)	± 70 mA
Storage temperature range	-65° C to + 150° C
Maximun power dissipation ( $P_D$ )	500 mW <u>2/</u>
Lead temperature (soldering, 10 seconds)	+200° C
Thermal resistance, junction-to-case ( $\theta_{JC}$ )	See MIL-M-38510, appendix C
Junction temperature ( $T_J$ )	+175° C

### 1.4 Recommended operating conditions.

Supply voltage range ( $V_{CC}$ )	+2.0 V dc to +6.0 V dc
Case operating temperature range ( $T_C$ )	-55° C to +125° C
Input rise or fall time:	
$V_{CC}$ = 2.0 V	0 to 1,000 ns
$V_{CC}$ = 4.5 V	0 to 500 ns
$V_{CC}$ = 6.0 V	0 to 400 ns

1/ Unless otherwise specified, all voltage are referenced to ground.

2/ For  $T_C$  = +100° C to +125° C, derate linearly at 12 mW/° C.

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## 2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

### SPECIFICATION

#### MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

### STANDARD

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

## 3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-M-38510, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2.1 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Truth table. The truth table shall be as specified on figure 2.

3.2.4 Logic diagram. The logic diagram shall be as specified on figure 3.

3.2.5 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full recommended case operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

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TABLE I. Electrical performance characteristics.

Test	Symbo	Conditions -55° C ≤ T <sub>C</sub> ≤ +125° C  (unless otherwise specified)		Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> minimum or V <sub>IL</sub> maximum,  I <sub>O</sub>   ≤ 20 μA	V <sub>CC</sub> = 2.0 V	1, 2, 3	1.9		V
			V <sub>CC</sub> = 4.5 V		4.4		
			V <sub>CC</sub> = 6.0 V		5.9		
		V <sub>IN</sub> = V <sub>IH</sub> minimum or V <sub>IL</sub> maximum,  I <sub>O</sub>   ≤ 6.0 mA	V <sub>CC</sub> = 4.5 V		3.7		
		V <sub>IN</sub> = V <sub>IH</sub> minimum or V <sub>IL</sub> maximum,  I <sub>O</sub>   ≤ 7.8 mA	V <sub>CC</sub> = 6.0 V		5.2		
Low level output voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> minimum or V <sub>IL</sub> maximum,  I <sub>O</sub>   ≤ 20 μA	V <sub>CC</sub> = 2.0 V	1, 2, 3		0.1	V
			V <sub>CC</sub> = 4.5 V			0.1	
			V <sub>CC</sub> = 6.0 V			0.1	
		V <sub>IN</sub> = V <sub>IH</sub> minimum or V <sub>IL</sub> maximum,  I <sub>O</sub>   ≤ 6.0 mA	V <sub>CC</sub> = 4.5 V			0.4	
		V <sub>IN</sub> = V <sub>IH</sub> minimum or V <sub>IL</sub> maximum,  I <sub>O</sub>   ≤ 7.8 mA	V <sub>CC</sub> = 6.0 V			0.4	
High level input voltage	V <sub>IH</sub>	<u>2/</u>	V <sub>CC</sub> = 2.0 V	1, 2, 3	1.5		V
			V <sub>CC</sub> = 4.5 V		3.15		
			V <sub>CC</sub> = 6.0 V		4.2		

See footnote at end of table.

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TABLE I. Electrical performance characteristics.

Test	Symbo	Conditions -55° C ≤ T <sub>C</sub> ≤ +125° C (unless otherwise specified)		Group A subgroups	Limits		Unit
					Min	Max	
Low level input voltage	V <sub>IL</sub>	<u>2/</u>	V <sub>CC</sub> = 2.0 V	1, 2, 3		0.3	V
			V <sub>CC</sub> = 4.5 V			0.9	
			V <sub>CC</sub> = 6.0 V			1.2	
Input capacitance	C <sub>IN</sub>	V <sub>IN</sub> = 0 V, T <sub>C</sub> = +25° C, see 4.3.1c		4		10	pF
Output capacitance	C <sub>out</sub>			4		20	
Quiescent current	I <sub>CC</sub>	V <sub>CC</sub> = 6.0 V, V <sub>IN</sub> = V <sub>CC</sub> or GND		1, 2, 3		160	μA
Input leakage current	I <sub>IN</sub>	V <sub>CC</sub> = 6.0 V, V <sub>IN</sub> = V <sub>CC</sub> or GND		1, 2, 3		±1	μA
Output leakage current	I <sub>OZ</sub>	V <sub>CC</sub> = 6.0 V, V <sub>out</sub> = V <sub>CC</sub> or GND		1, 2, 3		±10	μA
Functional tests		See 4.3.1.d		7			
Propagation delay time, An to Yan or Bn to YBn	t <sub>PHL</sub>	C <sub>L</sub> = 50 pF See figure 4  <u>3/</u>	V <sub>CC</sub> = 2.0 V	9		125	ns
				10, 11		185	
			V <sub>CC</sub> = 4.5 V	9		25	
				10, 11		37	
			V <sub>CC</sub> = 6.0 V	9		21	
				10, 11		45	
Propagation delay time, output ENABLE A, B to Yan or Ybn (enable)	t <sub>PZH</sub> , t <sub>PZL</sub>	C <sub>L</sub> = 50 pF See figure 4  <u>3/</u>	V <sub>CC</sub> = 2.0 V	9		175	ns
				10, 11		265	
			V <sub>CC</sub> = 4.5 V	9		35	
				10, 11		53	
			V <sub>CC</sub> = 6.0 V	9		30	
				10, 11		45	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics.

Test	Symbo	Conditions -55° C ≤ T <sub>C</sub> ≤ +125° C (unless otherwise specified)		Group A subgroups	Limits		Unit
					Min	Max	
Propagation delay time, output ENABLE A, B to YAn or YBn (disable)	t <sub>PHZ</sub> t <sub>PLZ</sub>	C <sub>L</sub> = 50 pF See figure 4  <u>3/</u>	V <sub>CC</sub> = 2.0 V	9		175	ns
				10, 11		265	
			V <sub>CC</sub> = 4.5 V	9		35	
				10, 11		53	
			V <sub>CC</sub> = 6.0 V	9		30	
				10, 11		45	
Transition time, rise and fall from any output	t <sub>THL</sub> , t <sub>TLH</sub>	C <sub>L</sub> = 50 pF See figure 4  <u>3/</u>	V <sub>CC</sub> = 2.0 V	9		60	ns
				10, 11		90	
			V <sub>CC</sub> = 4.5 V	9		12	
				10, 11		18	
			V <sub>CC</sub> = 6.0 V	9		10	
				10, 11		15	

1/ For a power supply of 5 V ±10%, the worse case output voltages (V<sub>OH</sub> and V<sub>OL</sub>) occur for HC at 4.5 V. Thus, the 4.5 V values should be used when designing with this supply. Worst case V<sub>IH</sub> and V<sub>IL</sub> occur at V<sub>CC</sub> = 5.5 V respectively. (The V<sub>IH</sub> value at 5.5 V is 3.85 V.) The worse case leakage current (I<sub>IN</sub>, I<sub>CC</sub>, and I<sub>OZ</sub>) occur for CMOS at the higher voltage and so the 6.0 V values should be used. Power dissipation capacitance (C<sub>PD</sub>), P<sub>D</sub> = C<sub>PD</sub> (V<sub>CC</sub> × V<sub>CC</sub>) f + (I<sub>CC</sub> × V<sub>CC</sub>), and the no load dynamic current consumption, I<sub>S</sub> = C<sub>PD</sub> (V<sub>CC</sub>)f + I<sub>CC</sub>.

2/ V<sub>IH</sub> and V<sub>IL</sub> test are not required and shall be applied as forcing functions for the V<sub>OH</sub> or V<sub>OL</sub> test.

3/ AC testing at V<sub>CC</sub> = 2.0 V and V<sub>CC</sub> = 6.0 V shall be guaranteed, if not tested, to the specified limits.

4/ Transition time (t<sub>TLH</sub>, t<sub>THL</sub>), if not tested, shall be guaranteed to the specified limits.

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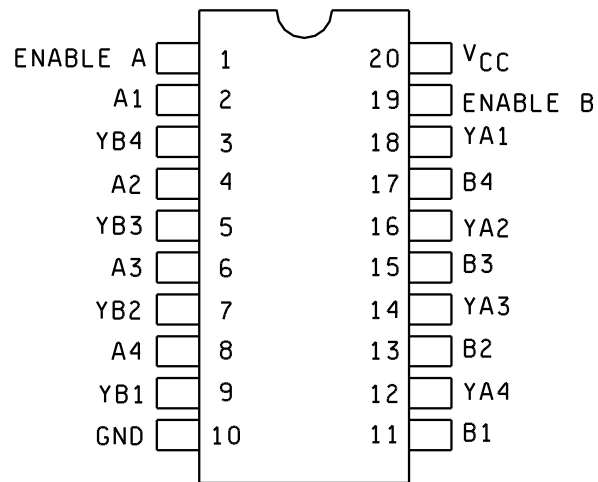
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# CASE R AND S



# CASE 2

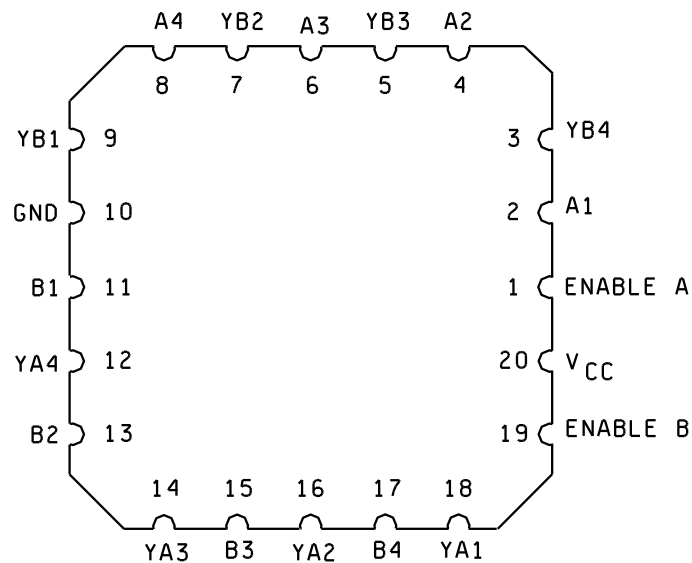


FIGURE 1. Terminal connections (top view).

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ENABLE A	An	YAn	ENABLE B	Bn	YBn
L	L	H	L	L	H
L	H	L	L	H	L
H	L	Z	H	L	Z
H	H	Z	H	H	Z

FIGURE 2. Truth table.

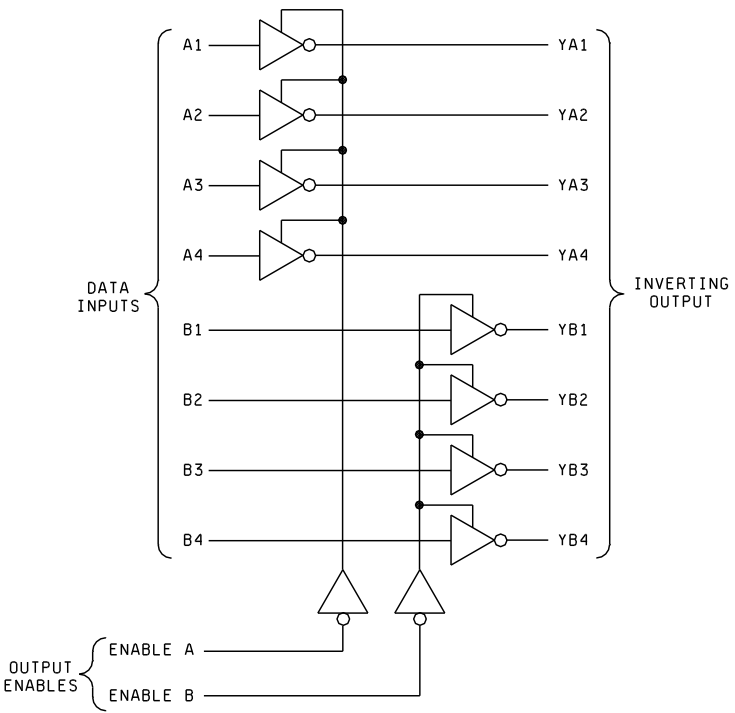
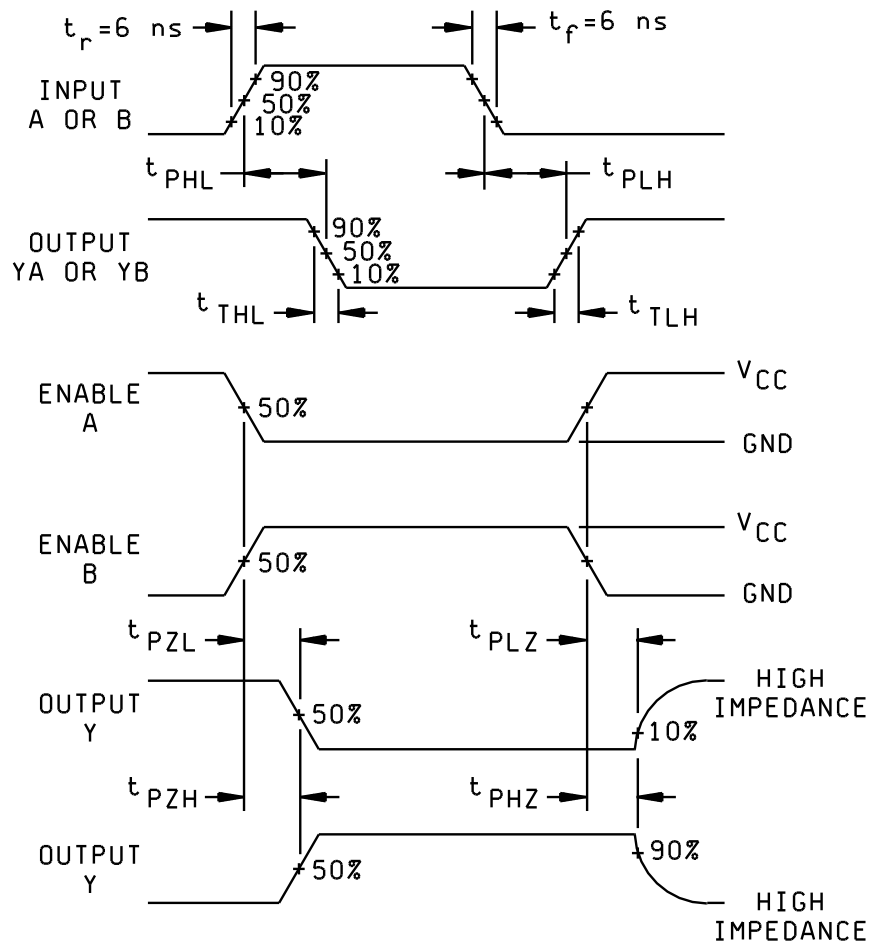


FIGURE 3. Logic diagram.

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PROPAGATION DELAY  
TIME TEST CIRCUIT.

OUTPUT ENABLE  
AND DISABLE TEST  
CIRCUIT.

FIGURE 4. Switching waveforms.

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#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

- a. Burn-in test (method 1015 of MIL-STD-883).
  - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

##### 4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5, 6, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 ( $C_{IN}$  and  $C_{out}$  measurements) shall be measured only for the initial test and after process or design changes which may affect capacitance. Test all applicable pins on 5 devices with zero failures.
- d. Subgroup 7 test shall verify the truth table as specified on figure 2.

##### 4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test (method 1005 of MIL-STD-883) conditions:
  - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
  - (3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

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TABLE II. Electrical test requirements.

Subgroups MIL-STD-883 test requirements	(per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*,2,3,9
Group A test requirements (method 5005)	1,2,3,7,9, 10,11**
Groups C and D end-point electrical parameters (method 5005)	1,2,3

\* PDA applies to subgroup 1.

\*\*Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Replaceability is determined as follows:

- a. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- b. When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/65703---.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

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6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <sup>1/</sup>	Replacement military specification partnumber
8407401RX <u>2/</u>	01295 04713 18714 27014	SNJ54HC240J 54HC240/BRAJC CD54HC240F/3A MM54HC240J/883	M38510/65703BRX
8407401SX	01295 27014	SNJ54HC240W MM54HC240W/883	M38510/6570BSX
84074012X <u>2/</u>	01295 04713 <del>27014</del>	SNJ54HC240FK 54HC240M/B2AJC <del>MM54HC240E/883</del>	M38510/65703B2X removed 6/5/92

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

2/ Inactive for new design. Use MIL-M-38510 QPL'd device.

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
01295	Texas Instruments, Incorporated P.O. Box 6448 Midland, TX 79701
04713	Motorola, Incorporated 7402 S. Price Road Tempe, AZ 85283
18714	RCA Corporation Semiconductor sector Route 202 Somerville, NJ 08876-0591
27014	National Semiconductor 333 Western Avenue South Portland, ME 04106

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